



Volunteer Lake Assessment Program Individual Lake Reports

HIGHLAND LAKE, STODDARD, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	19,008	Max. Depth (m):	9.6	Flushing Rate (yr ⁻¹)	10.3
Surface Area (Ac.):	712	Mean Depth (m):	1.6	P Retention Coef:	0.49
Shore Length (m):	25,300	Volume (m ³):	4,721,000	Elevation (ft):	1294

TROPHIC CLASSIFICATION

Year	Trophic class
1993	MESOTROPHIC
2004	MESOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

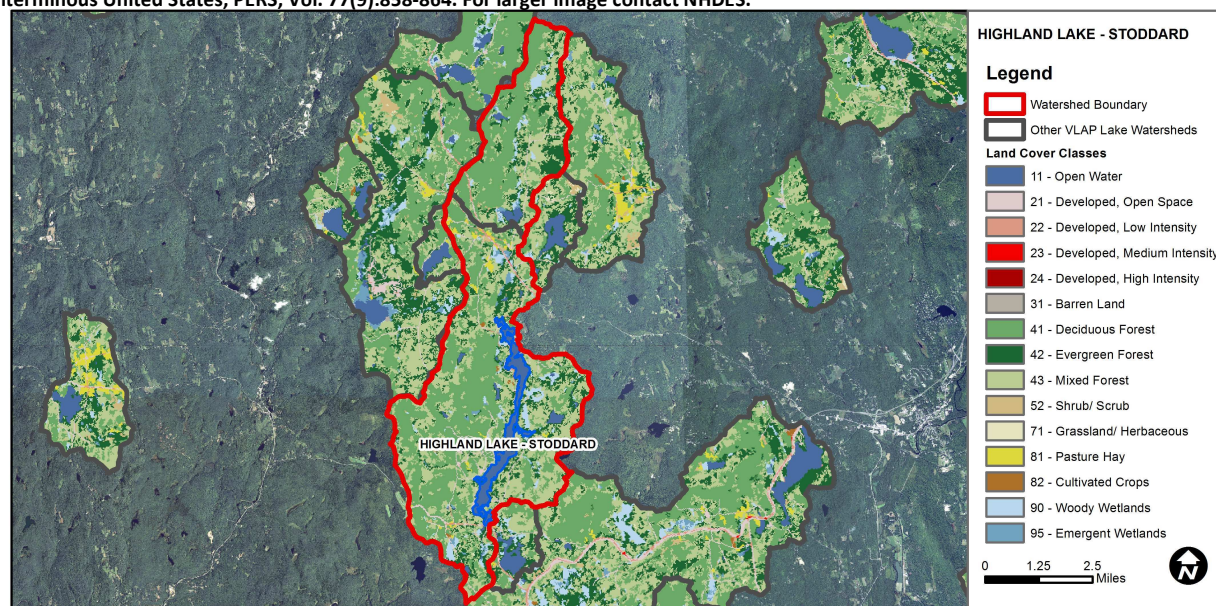
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Very Good	There are a total of at least 10 samples with 0 exceedances of criteria.
	Dissolved oxygen saturation	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

HIGHLAND LAKE-HIGHLAND LAKE BOAT LAUNCH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
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WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	5.2	Barren Land	0	Grassland/Herbaceous	0.05
Developed-Open Space	2.58	Deciduous Forest	39.23	Pasture Hay	0.92
Developed-Low Intensity	0.59	Evergreen Forest	15.01	Cultivated Crops	0.1
Developed-Medium Intensity	0.01	Mixed Forest	31.25	Woody Wetlands	3.49
Developed-High Intensity	0	Shrub-Scrub	0.58	Emergent Wetlands	0.91



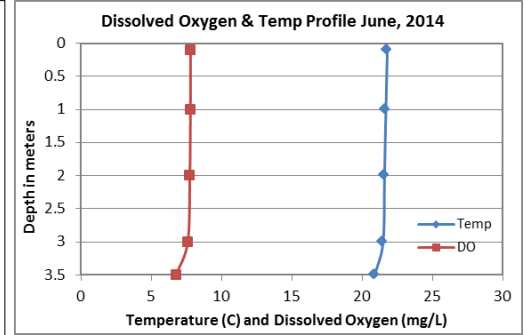
VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

HIGHLAND LAKE, SOUTH STN., STODDARD

2014 DATA SUMMARY

OBSERVATIONS AND RECOMMENDATIONS (Refer to Table 1 and Historical Deep Spot Data Graphics)

- ◆ **CHLOROPHYLL-A:** Chlorophyll levels were slightly elevated from June through September, increased from 2013, and were greater than the state median. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability between years.
- ◆ **CONDUCTIVITY/CHLORIDE:** Deep spot and tributary conductivity and chloride levels were generally less than the state medians. Historical trend analysis indicates highly variable epilimnetic (upper water layer) conductivity since monitoring began. Dead Brook conductivity and chloride levels were slightly greater than the other stations and likely due to the proximity of paved roads and the application of road salt in winter.
- ◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were low in June, increased in August, and then decreased to low levels in September. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus since monitoring began. We hope to see this continue! Carr Brook, Dead Brook and Rice Brook experienced slightly elevated to elevated phosphorus levels following a significant storm event in June. Carr Brook and Dead Brook phosphorus decreased to average levels in August and September. Rice Brook phosphorus levels remained slightly elevated in August and decreased to average levels in September. Kennedy Brook phosphorus levels were within a low to average range for that station.
- ◆ **TRANSPARENCY:** Transparency was lower than normal, decreased (worsened) from June to August, and then increased (improved) from August to September. The elevated algal growth likely contributed to the overall lower transparency. The 2014 average transparency decreased from 2013 and was less than the state median. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- ◆ **TURBIDITY:** Epilimnetic turbidity was slightly elevated throughout the summer likely due to the elevated algal growth. Carr Brook, Dead Brook, Kennedy Brook, and Rice Brook experienced elevated turbidity levels following a significant storm event in June and in September during low flows.
- ◆ **pH:** Deep spot and tributary pH levels were less than the desirable range 6.5-8.0 units. Historical trend analysis indicates relatively stable epilimnetic pH with moderate variability between years.
- ◆ **RECOMMENDED ACTIONS:** A significant storm event, > 6.0 in. of rain, occurred prior to the June sampling. Carr Brook, Dead Brook, Kennedy Brook, and Rice Brook experienced elevated turbidity and/or phosphorus following the storm event. This indicates potential areas of erosion and nutrient pollution in these sub-watersheds. Educate residents on ways to reduce stormwater runoff and erosion from their properties, and to utilize phosphate free fertilizers. DES' "NH Homeowner's Guide to Stormwater Runoff" is a great resource. High water levels may have covered nutrient-rich shoreline areas as well as caused erosion in some areas; this in turn could have contributed to the elevated algal growth and lower transparency. Try to maintain a consistent water level during the summer months to reduce shoreline flooding and erosion. Keep up the great work!



NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

Chloride: > 230 mg/L (chronic)

E. coli: > 88 cts/100 mL – public beach

E. coli: > 406 cts/100 mL – surface waters

Turbidity: > 10 NTU above natural level

pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.

Alkalinity: 4.9 mg/L

Chlorophyll-a: 4.58 mg/m³

Conductivity: 40.0 uS/cm

Chloride: 4 mg/L

Total Phosphorus: 12 ug/L

Transparency: 3.2 m

pH: 6.6

Station Name	Table 1. 2014 Average Water Quality Data for HIGHLAND LAKE								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	2.47	6.07	3	24.2	10	2.23	2.53	1.26	6.31
Carr Brook			3	22.3	14			1.59	6.15
Dead Brook			8	43.5	20			2.16	6.08
Kennedy Brook			3	17.3	12			1.22	6.11
Rice Brook			3	18.7	19			1.91	6.10

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data highly variable.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.

